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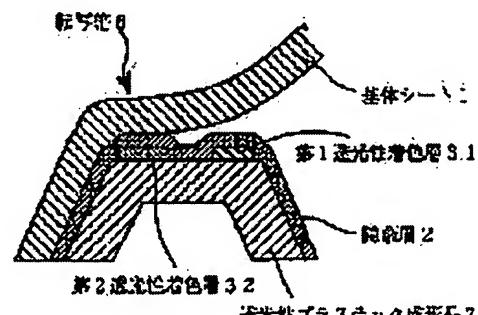
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(54) TRANSFER FOIL AND PRODUCTION OF PLASTIC MOLDED ARTICLE HAVING MULTI-COLOR, LIGHT-TRANSMITTING OPEN PATTERN

(57) Abstract:

PURPOSE: To obtain a plastic molded article having a multi-color, light-transmitting open pattern on the surface thereof without restricting the shape.

CONSTITUTION: In a transfer foil 6 in use, a masking layer 2 is formed on a substrate sheet 1 having a releasability, and light-transmitting color layers of two or more different colors, e.g. a first light-transmitting color layer 31 and a second light-transmitting color layer 32, are juxtaposed on the masking layer 2. The surface of the transfer foil 6 opposite to the substrate sheet 1 is brought into close contact with the surface of a light-transmitting plastic molded piece 7. This is heated and pressurized from on the substrate sheet 1. By releasing the substrate sheet 1, a plastic molded piece with the masking layer 2 and the light-transmitting color layers integrated with the light-transmitting



plastic molded piece 7 is obtained. Thereafter, a part of the masking layer 2 is cut off in a pattern form, such as characters and symbols, by laser etching for exposing the lower light-transmitting color layers. In this manner, a plastic molded article with a multi-color, light-transmitting open pattern is obtained.

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CLAIMS

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## [Claim(s)]

[Claim 1] The imprint foil characterized by forming a concealment layer, and coexisting and forming the translucency coloring layer of two or more different colors on a concealment layer on the base sheet which has a mold-release characteristic.

[Claim 2] The imprint foil according to claim 1 with which the transparence resin layer is formed between the concealment layer and the translucency coloring layer.

[Claim 3] The imprint foil according to claim 1 with which the metal layer is formed between the concealment layer and the translucency coloring layer.

[Claim 4] The imprint foil according to claim 1 to 3 with which the glue line is formed on the concealment layer and the translucency coloring layer.

[Claim 5] The base sheet and the opposite side of an imprint foil according to claim 1 to 4 are stuck on the front face of a translucency plastic part. After obtaining the plastic part with which heating pressurization was carried out, the base sheet was exfoliated, and the concealment layer and the translucency coloring layer were united with the translucency plastic part at least from the base sheet side, The manufacture approach of a plastic part of having the multicolor light transmission omission pattern characterized by exposing a lower translucency coloring layer by excising a part of concealment layer in the shape of [, such as an alphabetic character and a notation, ] a pattern by laser etching.

[Claim 6] An imprint foil according to claim 1 to 4 is laid between the injection-molding metal mold of a pair so that a base sheet side may touch a cavity side. Inject the molding resin of translucency in a cavity to the mold closure back, and the plastic part with which the base sheet was exfoliated and the concealment layer and the translucency coloring layer were united with the translucency plastic part at least after carrying out cooling solidification is obtained. The manufacture approach of a plastic part of having the multicolor light transmission omission pattern characterized by exposing a lower translucency coloring layer by excising a part of concealment layer in the shape of [, such as an alphabetic character and a notation, ] a pattern by laser etching.

## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

#### [0001]

[Industrial Application] This invention relates to the manufacture approach of a plastic part of having the imprint foil and the multicolor light transmission omission pattern which are used in order to manufacture the plastic part which light transmission nature, such as a keytop of the front panel of an AV equipment, a carbon button, and a personal computer and an instruments panel of an automobile, extracts, and has a pattern.

#### [0002]

[Description of the Prior Art] Light transmission omission character patterns, such as an alphabetic character on a side front and a notation, emit light to plastic parts, such as a keytop of the front panel of an AV equipment, a carbon button, and a personal computer, and an instruments panel of an automobile, with the lighting from a background, and other parts have some which are constituted so that it may shade in them. Conventionally, there is the following as the manufacture approach of a plastic part of having this kind of light transmission omission character pattern.

[0003] (1) How to carry out injection molding of the protection-from-light nature plastic-molding section, and unify so that all other than the part into which patterns, such as an alphabetic character and a notation, projected where it carried out injection molding of the formal translucency plastic-molding section which made only the part of patterns, such as an alphabetic character and a notation, project, next this translucency plastic-molding section is laid in metal mold at first by the so-called two color molding of translucency plastics and protection-from-light nature plastics may be covered.

[0004] (2) How to carry out an overcoat to the front face of the translucency plastic part by which color coloring was carried out in the coatings of protection-from-light nature, excise this layer by which the overcoat was carried out on it in the shape of [, such as an alphabetic character and a notation, ] a pattern by laser etching, make expose a translucency plastic part front face to it, and manufacture.

[0005] (3) How to form the translucency coloring layer which has the translucency of patterns, such as an alphabetic character and a notation, form a protection-from-light nature coloring layer in parts other than a translucency coloring layer, and manufacture by print processes, such as pad printing and screen-stencil, on the even front face of a translucency plastic part.

#### [0006]

[Problem(s) to be Solved by the Invention] However, there are the following problems in the approach of above-mentioned (1) - (3).

[0007] The approach of (1) must prepare two kinds of metal mold and injection equipment of the metal mold for carrying out injection molding of the translucency plastic-molding section, and the metal mold for carrying out injection molding of the protection-from-light nature plastic-molding section, and requires costs, such as an installation cost. Moreover, since the color of a light transmission omission pattern is the part which the translucency plastic-molding section made project, the plastic part which has a multicolor light transmission omission character pattern is not obtained.

[0008] Since the color of a light transmission omission pattern depends the approach of (2) on exposure of a translucency plastic part, the plastic part which has a multicolor light transmission omission character pattern is not obtained.

[0009] Since print processes are used for the approach of (3) in order to form a translucency coloring layer and a protection-from-light nature coloring layer in the front face of a translucency plastic part, it is hard to form it in a concave bend side, the large concave convex of boom hoisting, and two or more fields of the mold goods of a polyhedron configuration.

[0010] Therefore, the manufacture approach of a plastic part of having the imprint foil and the multicolor light transmission omission pattern of this invention solves the above troubles, and there is no constraint in a configuration, and it aims at offering the plastic part which has a multicolor light transmission omission pattern on a front face.

#### [0011]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the imprint foil of this invention was constituted as a concealment layer was formed and the translucency coloring layer of two or more different colors on a concealment layer was coexisted and formed on the base sheet which has a mold-release characteristic.

[0012] In the above-mentioned configuration, the transparency resin layer may be formed between the concealment layer and the translucency coloring layer, and the metal layer may be formed.

[0013] Moreover, the glue line may be formed on the concealment layer and the translucency coloring layer.

[0014] The manufacture approach of a plastic part of having the multicolor light transmission omission pattern of this invention The above-mentioned base sheet and the above-mentioned opposite side of an imprint foil are stuck on the front face of a translucency plastic part. After obtaining the plastic part with which heating pressurization was carried out, the base sheet was exfoliated, and the concealment layer and the translucency coloring layer were united with the translucency plastic part at least from the base sheet side, By excising a part of concealment layer in the shape of [, such as an alphabetic character and a notation, ] a pattern by laser etching, it constituted so that a lower translucency coloring layer might be exposed.

[0015] Moreover, the manufacture approach of a plastic part of having the multicolor light transmission omission pattern of this invention The above-mentioned imprint foil is laid between the injection-molding metal mold of a pair so that a base sheet side may touch a cavity side. Inject the molding resin of translucency in a cavity to the mold closure back, and the plastic part with which the base sheet was exfoliated and the concealment layer and the translucency coloring layer were united with the translucency plastic part at least after carrying out cooling solidification is obtained. You may make it expose a lower translucency coloring layer by excising a part of concealment layer in the shape of [, such as an alphabetic character and a notation, ] a pattern by laser etching.

[0016] Hereafter, this invention is explained in more detail, referring to a drawing.

[0017] First, the imprint foil 6 of this invention is explained (refer to drawing 1 ).

[0018] The base sheet 1 supports the translucency coloring layer (for example, the 1st translucency coloring layer 31, the 2nd translucency coloring layer 32) of two or more different colors formed by coexisting on the concealment layer 2 and this concealment layer 2, and after pasting up the imprint foil 6 on the translucency plastic part 7, exfoliation removal of it is carried out from translucency plastic part 7 front face. As a base sheet 1, plastic film and papers, such as polyethylene terephthalate, polypropylene, polyethylene, nylon, and cellophane, or these complex films use what is used as a base sheet of the usual imprint foil. Moreover, in order to give a mold-release characteristic further to these base sheets 1, the mold release layer which exfoliates with the base sheet 1 after an imprint can be formed on the base sheet 1. As the quality of the material of a mold release layer, there are melamine resin, silicon resin, a fluororesin, fibrin system resin, a urea-resin, polyolefin resin, and paraffin resin.

[0019] The concealment layer 2 is a layer of the protection-from-light nature which conceals translucency plastic part 7 front face and a translucency coloring layer after an imprint. As the quality of the material of the concealment layer 2, the thing which made the coloring matter of concealment nature, such as carbon black, contain is in resin binders, such as acrylic resin and polyester resin. As the formation approach of the concealment layer 2, there are the coat methods, such as the usual print processes, such as gravure and screen-stencil, and the roll coat method. In addition, the concealment layer 2 may be solid color and may have the pattern. Moreover, the layer which has metallic luster as a concealment layer 2 may be formed. The layer which has metallic luster is obtained by forming by vacuum evaporation technique, the sputtering method, the ion plating method, etc., sticking a metallic foil, or printing in metallic pigment ink.

[0020] Translucency coloring layers, such as the 1st translucency coloring layer 31 and the 2nd translucency coloring layer 32, are layers of the translucency which is exposed, extracts and forms a pattern from a part of concealment layer by excising a concealment layer by laser etching after an imprint. As the quality of the material of a translucency coloring layer, the thing which made the coloring matter of the transparency of a color, a glazing color, etc. contain is in resin binders, such as

acrylic resin and vinyl chloride resin. As the formation approach of a translucency coloring layer, there are the usual print processes, such as gravure and screen-stencil. In addition, the 3rd translucency coloring layer, the 4th translucency coloring layer, etc. may be formed further, without limiting the translucency coloring layer of a different color to two colors of the 1st translucency coloring layer and the 2nd translucency coloring layer.

[0021] Moreover, with the imprint foil 6 of this invention, the transparence resin layer 4 may be formed between the concealment layer 2 and translucency coloring layers, such as the 1st translucency coloring layer 31 and the 2nd translucency coloring layer 32, (refer to drawing 2 ). When the translucency coloring layer and the concealment layer 2 have touched, it is difficult to excise only a concealment layer bordering on both interface in the laser etching process mentioned later, and there is a possibility that it may be etched to a translucency coloring layer. In this case, the surface state and thickness of a translucency coloring layer will differ from each other, and the translucency coloring layer with which it is expressed as a light transmission omission pattern may become nonuniformity. By forming the transparence resin layer 4 in the bottom of the part made to etch, a translucency coloring layer can be protected from laser etching after an imprint. As the quality of the material of the transparence resin layer 4, there is resin, such as acrylic resin, 2 liquid hardenability urethane resin, and polyester resin. As the formation approach of the transparence resin layer 4, there are the coat methods, such as the usual print processes, such as gravure and screen-stencil, and the roll coat method, etc. Moreover, in order to protect a translucency coloring layer for a translucency coloring layer from laser etching after an imprint, a metal layer may be formed instead of said transparence resin layer 4. There are aluminum, copper, etc. as the quality of the material of a metal layer. As the formation approach of a metal layer, there are some which were formed by vacuum evaporation technique, the sputtering method, the ion plating method, etc.

[0022] Moreover, when the resin which has an adhesive property as a resin binder of a translucency coloring layer is used, a translucency coloring layer pastes up with the translucency plastic part 7. However, when a translucency coloring layer does not have an adhesive property, it is good to form a glue line 5 independently (refer to drawing 3 ). As the quality of the material of a glue line 5, the sensible-heat adhesive property resin suitable for the translucency plastic part 7, pressure-sensitive adhesive property resin, or resin equipped with both properties is used. For example, when the translucency plastic part 7 consists of polystyrene resin and the translucency plastic part 7 consists acrylic resin and vinyl chloride system resin of polypropylene resin, it is good to use a chlorination polypropylene resin, ethylene vinyl acetate system resin, etc. As the formation approach of a glue line 5, there are the coat methods, such as the usual print processes, such as gravure and screen-stencil, and the roll coat method, etc.

[0023] Next, the manufacture approach of a plastic part of having the multicolor light transmission omission pattern 9 using this imprint foil 6 is explained ( drawing 4 - 6 reference).

[0024] First, the above mentioned base sheet 1 and the above mentioned opposite side of the imprint foil 6 are stuck on the front face of the translucency plastic part 7 (refer to drawing 4 ), heating pressurization is carried out from the base sheet 1 side, the base sheet 1 is exfoliated, and the plastic part with which the translucency coloring layer of a color which is different from the concealment layer 2 in the translucency plastic part 7 was unified is obtained (refer to drawing 5 ).

[0025] The translucency plastic parts 7 are mold goods which have the translucency fabricated with acrylic resin, acrylonitrile-styrene resin, styrene resin, polycarbonate resin, etc. The configuration of the translucency plastic part 7 has the thing of a configuration which has the front face which cannot be printed, what is carrying out the polyhedron configuration, the thing of a configuration which has the even field which can be printed, etc. in print processes like for example, a concave bend side.

[0026] Heating pressurization is good for the heated rubber covered roll and a silicon pad to perform under the temperature of about 200-250 degrees C. By carrying out heating pressurization, the adhesive resin of a translucency coloring layer becomes soft, and translucency plastic part 7 front face is pasted. When the glue line 5 is formed in the imprint foil 6, a glue line 5 pastes translucency plastic part 7 front face.

[0027] Next, the plastic part which is made to expose a lower translucency coloring layer and has the light transmission omission character pattern 9 is obtained by excising the concealment layer 2 in the shape of [, such as an alphabetic character, a notation, and a pattern, ] a pattern by laser etching (refer to drawing 6 ).

[0028] The manufacture approach of a plastic part of having the multicolor light transmission omission pattern 9 using a shaping coincidence replica method is explained (refer to drawing 7 - drawing 9 ).

[0029] First, the above mentioned imprint foil 6 is laid between the injection-molding metal mold 8 of a pair so that the base sheet 1 side may touch a cavity side (refer to drawing 7 ), the molding resin of translucency is injected in a cavity to the mold closure back, and after carrying out cooling solidification, the plastic part with which the base sheet 1 was exfoliated and the concealment layer 2 and the translucency coloring layer were united with the translucency plastic part 7 is obtained (refer to drawing 8 ).

[0030] A cavity is formed by being mold closure carried out of the injection-molding metal mold 8 of a pair. The resin injection hole by which the molding resin of translucency is injected is formed in one injection-molding metal mold. As molding resin, there is polybutyrene terephthalate resin etc., for example.

[0031] By injecting molding resin in a cavity and contacting a translucency coloring layer, the adhesive resin of a translucency coloring layer becomes soft, and translucency plastic part 7 front face is pasted. When the glue line 5 is formed in the imprint foil 6, a glue line 5 pastes translucency plastic part 7 front face.

[0032] The plastic part which is made to expose a lower translucency coloring layer and has the light transmission omission pattern 9 is obtained by next excising the concealment layer 2 in the shape of [, such as an alphabetic character, a notation, and a pattern, ] a pattern by laser etching like a replica method (refer to drawing 9 ).

[0033] In addition, it may be colored by the translucency coloring layer of a different color for every pattern, and a light transmission omission pattern may be colored by the translucency coloring layer of a different color which the one pattern adjoined (refer to drawing 9 and drawing 10 ) (refer to [ drawing 11 and ] the drawing 1212 ).

[0034]

[Function] Since the manufacture approach of a plastic part of having the imprint foil and the multicolor light transmission omission pattern of this invention consists of the above-mentioned configuration, the next operation is acquired.

[0035] In this invention, with namely, the replica method or shaping coincidence replica method which used the imprint foil A concealment layer and the translucency coloring layer of two or more different colors covered with this concealment layer are formed in a translucency plastic part front face. Subsequently, by excising a wrap part for the translucency coloring layer of a concealment layer in the shape of [, such as an alphabetic character and a notation, ] a pattern by laser etching, the translucency coloring layer of a different color currently formed in the lower part of a concealment layer by coexisting is exposed.

[0036]

[Example]

On the base sheet which consists of an example 1 polyethylene-terephthalate film, the concealment layer was formed in gravure using the black ink which made carbon black contain into the resin binder which consists of polyester resin. On the concealment layer, the transparency resin layer which consists of acrylic resin was formed in gravure. On the transparency resin layer, the 1st translucency coloring layer was formed in gravure using the ink which made the green color contain into the resin binder which consists of acrylic resin, using the ink which made the red color contain, it coexisted with the 1st translucency coloring layer, and the 2nd translucency coloring layer was formed in gravure into the resin binder which consists of acrylic resin. The glue line which consists of polyester resin was formed in gravure on these concealment layer, the transparency resin layer, and the translucency coloring layer, and the imprint foil was obtained.

[0037] The base sheet and the opposite side of such an imprint foil were stuck on the front face of the translucency plastic part of a polyhedron configuration. Next, heating pressurization was carried out with the rubber covered roll heated by 220 degrees C from the base sheet side, and the plastic part with which the base sheet was exfoliated and the concealment layer, the 1st translucency coloring layer, and the 2nd translucency coloring layer were united with the translucency plastic part was obtained.

Subsequently, the lower 1st translucency coloring layer and the lower 2nd translucency coloring layer were exposed by excising [ the 1st translucency coloring layer of a concealment layer, or the 2nd translucency coloring layer ] the alphabetic character of a "day" and a "copy" for a wrap part in the shape of a pattern by laser etching, respectively.

[0038] The plastic part which has the light transmission omission pattern obtained as mentioned above was what has a green light transmission omission pattern "Sun." and a blue light transmission omission pattern "a copy" on the translucency plastic part front face of a polyhedron configuration.

[0039] The imprint foil of the same configuration as the imprint foil used in the example 2 example 1 was laid between the injection-molding metal mold of a pair so that a base sheet side might touch a cavity side. Next, polybutyrene terephthalate resin was injected as molding resin of translucency in the cavity to the mold closure back, and after carrying out cooling solidification, the base sheet was exfoliated, and the plastic part with which the concealment layer, the 1st translucency coloring layer, and the 2nd translucency coloring layer were united with the translucency plastic part was obtained.

Subsequently, the lower 1st translucency coloring layer and the lower 2nd translucency coloring layer were exposed by excising [ the 1st translucency coloring layer of a concealment layer, or the 2nd translucency coloring layer ] the notation of "+" and "-" for a wrap part in the shape of a pattern by laser etching.

[0040] The plastic part which has the light transmission omission pattern obtained as mentioned above was what has a green light transmission omission pattern "+" and a blue light transmission omission pattern "-" on the translucency plastic part front face of a polyhedron configuration.

[0041]

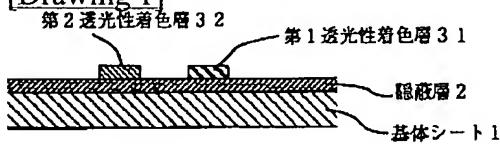
[Effect of the Invention] Since this invention has an above-mentioned configuration and an above-mentioned operation, the following effectiveness is acquired.

[0042] That is, by the manufacture approach of a plastic part of the imprint foil of this invention and multicolor light transmission nature extracting, and having a pattern, since a concealment layer and the translucency coloring layer of two or more different colors covered with this concealment layer are formed in a translucency plastic part front face by the replica method or the shaping coincidence replica method, in printing, light transmission nature can extract even on a difficult front face, forming can form a pattern in it easily, and the product which does not have constraint in a configuration can be obtained.

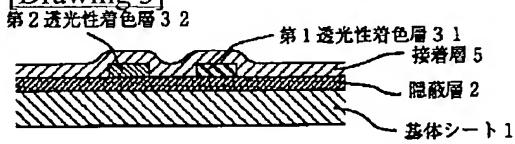
[0043] Moreover, in this invention, since the translucency coloring layer of a different color coexists and it is formed in a translucency plastic part front face, light transmission nature extracts and the plastic part whose pattern is multiple color is obtained.

## DRAWINGS

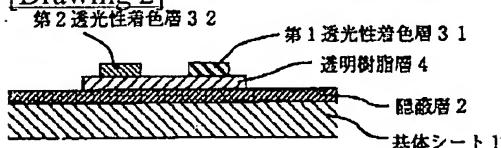
## [Drawing 1]



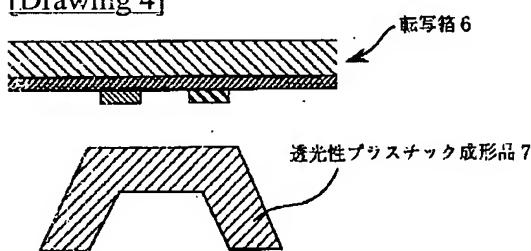
## [Drawing 3]



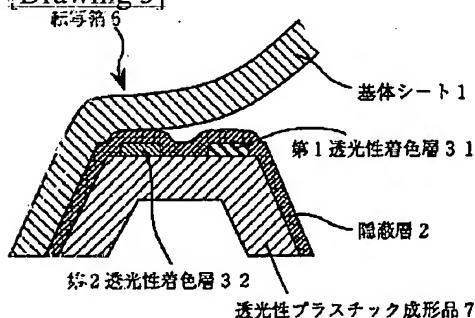
## [Drawing 2]



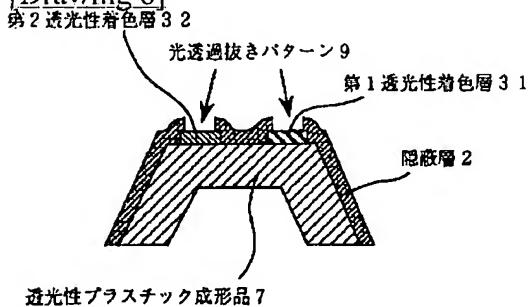
## [Drawing 4]



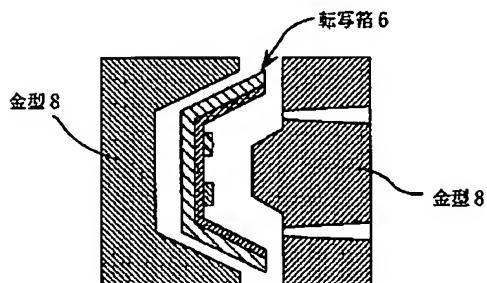
## [Drawing 5]



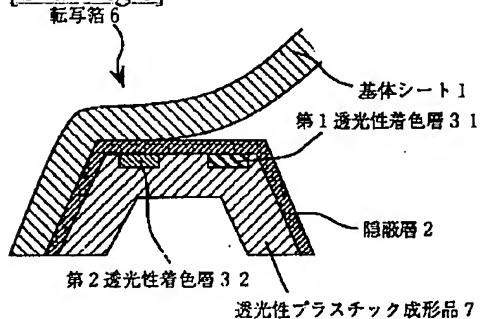
## [Drawing 6]



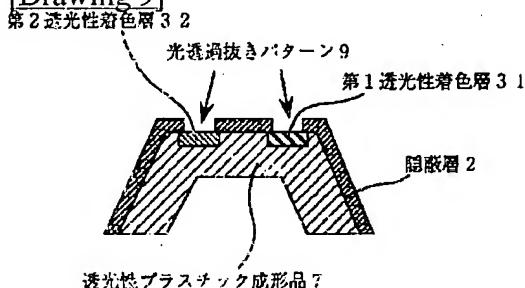
## [Drawing 7]



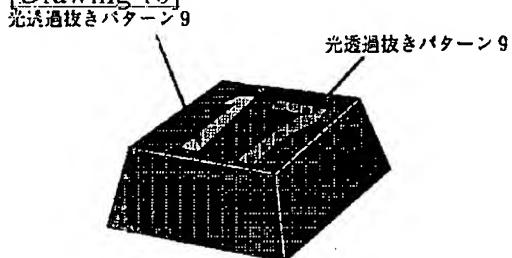
[Drawing 8]



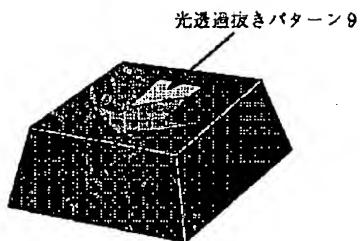
[Drawing 9]



[Drawing 10]



[Drawing 11]



[Drawing 12]

